EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

January 19, 2017

The Honorable Fred Upton
Chairman
Committee on Energy and Commerce
U. S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

The report on Federal Expenditures on Science, Energy, and International Assistance Programs that Advance the Federal Response to Climate Change is being provided to you in response to Title IV, Division G, Section 419 of P.L. 113-76, the Consolidated Appropriations Act of 2014; Title IV, Division F, Section 418 of P.L. 113-235, the Consolidated and Further Continuing Appropriations Act of 2015; and Title IV, Division G, Section 416 of P.L. 114-113, the Consolidated Appropriations Act of 2016.

Climate change is not just an environmental challenge, but a pressing economic and fiscal threat. As with many of the challenges we face, a failure to act will lead to greater costs and risks to our economy in the future. Federal funding in the climate change arena focuses on advancing our scientific understanding of global change; supporting energy-efficient, renewable energy, and low-emitting technologies; and mobilizing bilateral and multilateral assistance tools to promote low-carbon and resilient development. The enclosed report provides a comprehensive accounting of Federal expenditures on programs in these areas, including funding for both domestic and international activities.

Sincerely,

Shaun Donovan
Director

Enclosure

Identical Letters Sent to:

The Honorable Rodney Frelinghuysen
The Honorable Nita Lowey
The Honorable Ken Calvert
The Honorable Betty McCollum
The Honorable Bill Shuster
The Honorable Peter DeFazio
The Honorable Fred Upton
The Honorable Frank Pallone
The Honorable Thad Cochran
The Honorable Patrick Leahy
The Honorable Lisa Murkowski
The Honorable Tom Udall
The Honorable John Barrasso
The Honorable Tom Carper

REPORT TO CONGRESS:

FEDERAL EXPENDITURES ON SCIENCE, ENERGY AND INTERNATIONAL ASSISTANCE PROGRAMS THAT ADVANCE THE FEDERAL RESPONSE TO CLIMATE CHANGE

FISCAL YEARS
2013-2016

January 2017

TABLE OF CONTENTS

REPORT TO CONGRESS: FEDERAL EXPENDITURES ON SCIENCE, ENERGY AND INTERNATIONAL ASSISTANCE PROGRAMS THAT ADVANCE THE FEDERAL RESPONSE TO CLIMATE CHANGE: FISCAL YEARS 2013-2016

1. INTRODUCTION

The following is an accounting of Federal funding in Fiscal Years 2013-2016 and the FY 2017 President's Budget for domestic and international programs and activities that advance our understanding of global change; support the development, introduction, and deployment of energy-efficient, renewable energy, and low-emitting technologies; or mobilize bilateral and multilateral assistance tools to promote low-carbon and resilient development.[1]

Total Federal expenditures in these areas have declined by 22 percent between FY 2013 and FY 2016 due to declining tax expenditures (-53 percent), which were partly offset by increased direct expenditures on science, clean energy technology, and international assistance programs (28 percent). The FY 2017 President's Budget proposed an increase of 13 percent over FY 2016 Enacted levels for these direct expenditure programs, which would have increased total expenditures captured in this report by 3 percent.

The Federal programs and activities presented in this report provide a broad set of benefits for American taxpayers. Clean energy technology programs and energy-related tax provisions work to enhance American energy security, improve public health, generate new jobs, and reduce energy bills for American ratepayers while reducing emissions of heat-trapping gases that affect the climate. Science programs advance our knowledge of integrated natural and human components of the Earth system and provide the scientific basis to inform and enable timely decisions. International assistance programs enhance global economic growth, prosperity, and stability by promoting sustainable and secure sources of energy and by helping societies strengthen water security, land management, disaster planning, financial risk management, and management of biodiversity and natural resources.

[1] This report is provided in response to Title IV, Division G, Section 419 of P.L. 113-76, the Consolidated Appropriations Act of 2014; Title IV, Division F, Section 418 of P.L. 113-235, the Consolidated and Further Continuing Appropriations Act of 2015; and Title IV, Division G, Section 416 of P.L. 114-113, the Consolidated Appropriations Act of 2016.

Table 1

Summary of Federal Expenditures

(budget authority in millions of dollars)

Summary of Federal Expenditures	FY 2013 Final Operating Level	FY 2014 Enacted Budget Authority	FY 2015 Enacted Budget Authority	FY 2016 Enacted Budget Authority	FY 2017 President's Budget Request
U.S. Global Change Research Program (USGCRP)	2,417	2,492	2,461	2,584	2,775
Clean Energy Technologies	5,755	6,567	6,999	7,539	8,978
International Assistance [1,2]	916	1,013	1,252	1,527	1,426
Energy-Related Tax Provisions That May Reduce Greenhouse Gases [3]	6,329	6,509	5,610	5,540	5,170
Energy Payments in Lieu of Energy Investment Credit [4]	8,080	4,710	2,300	1,200	650
Adjustments for programs included in multiple categories	*-26*	*-27*	*-23*	*-23*	*-26*
Total	**23,471**	**21,264**	**18,599**	**18,367**	**18,973**

Footnotes:

[1] International Assistance includes congressionally appropriated assistance by core agencies (i.e. Department of State, Department of Treasury, US Agency for International Development) as well as complementary agencies (e.g., Environmental Protection Agency), but does not include indirect climate assistance nor development finance and export credit agencies.

[2] The International Assistance total contains funds that are also counted in the USGCRP and Clean Energy Technology totals. Table total line excludes this double-count.

[3] Tax expenditures are estimates of the revenue losses due to a tax preference. While not exactly equivalent to budget authority, tax expenditure estimates are included for completeness.

[4] Firms can take an energy payment in lieu of certain tax credits. The payments are considered outlays and are direct substitutes for the energy-related tax provisions. Estimates have been included in all columns for completeness.

2. SCIENCE

The U.S. Global Change Research Program (USGCRP) was established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act of 1990. The purpose of USGCRP is "to assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." The program coordinates scientific research across 13 Federal departments and agencies.

Table 2
U.S. Global Change Research Program

Details by Agency/Account

(Budget authority in millions of dollars)

U.S. Global Change Research Program (USGCRP)	FY 2013 Final Operating Level	FY 2014 Enacted Budget Authority	FY 2015 Enacted Budget Authority	FY 2016 Enacted Budget Authority	FY 2017 President's Budget Request
Department of Agriculture					
Agricultural Research Service	38	38	45	45	65
National Institute of Food and Agriculture	40	43	20	15	19
Economic Research Service	2	2	1	2	3
Forest Service: Forest and Rangeland Research	26	27	25	28	28
National Agricultural Statistics Service	1	1	1	1	1
Natural Resources Conservation Services	1	1	2	3	3
Animal and Plant Health Inspection Service	0	0	0	<0.5	<0.5
Farm Service Agency	0	0	0	1	1
Office of the Chief Economist	0	3	3	3	3
Subtotal – USDA	**108**	**115**	**97**	**98**	**124**
Department of Commerce					
National Oceanic and Atmospheric Administration: Operations, Research, and Facilities	233	285	264	252	307
National Oceanic and Atmospheric Administration: Procurement, Acquisition, and Construction	64	40	44	28	31
National Institute of Standards and Technology	4	4	4	4	4
Subtotal – DOC	**301**	**329**	**312**	**283**	**342**
Department of Energy					
Science: Biological & Environmental Research	**209**	**217**	**214**	**238**	**242**
Department of Health and Human Services [1]					
National Institutes of Health	8	8	8	8	8
Department of the Interior					
U.S. Geological Survey: Surveys, Investigations, and Research	**55**	**54**	**58**	**57**	**63**
Department of Transportation					
Federal Highway Administration: Federal-Aid Highways	0	0	0	0	0
Federal Aviation Administration: Research, Engineering, and Development	1	1	1	1	1

Federal Transit Administration: Research and University Research Centers	0	0	0	0	0
Subtotal – DOT	**1**	**1**	**1**	**1**	**1**
Environmental Protection Agency					
Science and Technology	**17**	**18**	**16**	**19**	**22**
National Aeronautics and Space Administration					
Science	1,395	1,431	1,417	1,534	1,617
National Science Foundation					
Research and Related Activities	**316**	**313**	**331**	**339**	**348**
Smithsonian Institution					
Salaries and Expenses	**8**	**8**	**8**	**8**	**9**
U.S. Agency for International Development					
Development Assistance - non-add [2]	*11*	*11*	*6*	*9*	*10*
Department of State					
Other- non-add [2]	*3*	*3*	--	--	--
Total [3]	**2,417**	**2,492**	**2,461**	**2,584**	**2,775**

[1] In prior years, the Centers for Disease Control and Prevention were included in this table, with budget authority of less than $500,000. These CDC funds are no longer included in this table.
[2] State and USAID funding has supported USGCRP and the Climate Change International Assistance effort. In the past, some USAID funding was counted under both categories. These efforts are not included in the USGCRP total in this table.
[3] Agency subtotals may not add to table total due to rounding.

LINKAGES TO STRATEGIC PLANS

U.S. Global Change Research Program	USGCRP 2012-2021 Strategic Plan
Department of Agriculture	USDA Strategic Plan 2014-2018; **Goal 2:** *Ensure our National forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources.*
Department of State & U.S. Agency for International Development	Department of State and USAID Strategic Plan 2014-2017; **Strategic Goal 3:** *Promote the transition to a low-emission, climate-resilient world while expanding global access to sustainable energy.* USAID Policy Framework 2011-2015; **Third Core Development Objective:** *Reduce Climate Change Impacts and Promote Low Emissions Growth: Building Resilience on Multiple Fronts.*
Department of Commerce	Commerce Strategic Plan 2014-2018; **Strategic Goal 3:** *Help communities and businesses prepare for and prosper in a changing environment.*
Department of Energy	DOE Strategic Plan 2014-2018; **Goal 1:** *Advance foundational science, innovate energy technologies, and inform data driven policies that enhance U.S. economic growth and job creation, energy security,*

	and environmental quality, with emphasis on implementation of the President's Climate Action Plan to mitigate the risks of and enhance resilience against climate change.
National Institutes of Health	National Institute of Environmental Health Sciences Strategic Plan 2012-2017; **Goal 5:** *Identify and respond to emerging environmental threats to human health, on both a local and global scale.*
Department of Interior	DOI Strategic Plan 2014-2018; **Mission Area 6:** *Building a landscape-level understanding of our resources.*
Department of Transportation	DOT Strategic Plan 2014-2018; **Strategic Goal:** *Advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources.*
Environmental Protection Agency	EPA Strategic Plan 2014-2018; **Goal 1:** *Addressing climate change and improving air quality;* **Goal 2:** *Protecting America's water.*
National Aeronautics and Space Administration	**NASA FY 2014 Strategic Plan; Strategic Goal:** *Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.*
National Science Foundation	NSF Strategic Plan 2014-2018; **Strategic Goal 1:** *Transform the frontiers of science and engineering;* **Strategic Goal 2:** *Stimulate innovation and address societal needs through research and education.*
Smithsonian Institution	SI Strategic Plan 2010-2015 **(extended through 2017); Goal:** *Advance and synthesize knowledge that contributes to the survival of at-risk ecosystems and species.*

3. CLEAN ENERGY TECHNOLOGIES

Table 3
Clean Energy Technologies

Details by Agency/Account

(Budget authority, obligations, and outlays in millions of dollars)

Clean Energy Technologies	FY 2013 Final Operating Level	FY 2014 Enacted Budget Authority	FY 2015 Enacted Budget Authority	FY 2016 Enacted Budget Authority	FY 2017 President's Budget Request
Department of Agriculture					
Natural Resources Conservation Service: Conservation Operations	<0.5	<0.5	<0.5	<0.5	<0.5
Agricultural Research Service: Salaries and Expenses	32	32	33	30	31
National Institute of Food and Agriculture: Research and Education Activities	56	49	53	48	67
Forest Service: Commercialization/Renewable Energy	22	21	20	26	26
Forest Service: Forest and Rangeland Research	0	6	6	6	6
Rural Business Cooperative Service: Value Added Producer Grants (Cooperative Development Grants)	1	1	1	1	1
Rural Business Cooperative Service: Rural Energy Program Account (Rural Energy for America Sec. 9007)	3	53	48	47	69
Rural Business Cooperative Service: Guaranteed Business and Industry Loans	5	7	8	4	4
Rural Business Cooperative Service: Rural Economic Development Loans	<0.5	<0.5	<0.5	<0.5	1
Economic Research Service	2	2	3	3	3
Office of the Chief Economist: Salaries and Expenses [1]	3	5	2	2	2
Rural Utilities Service: High Cost Energy Grants	4	4	8	10	0
2008 Farm Bill, Mandatory Funding					
Rural Business Cooperative Service: Rural Energy Program Account (Rural Energy for America Sec. 9007)	0	0	0	0	0
Rural Business Cooperative Service: Value Added Producer Grants (Cooperative Development Grants)	0	5	0	0	0
National Institute of Food and Agriculture: Biomass Research and Development (Sec. 9008)	0	3	3	3	3
Farm Service Agency: Biomass Crop Assistance Program	0	25	23	3	3
Farm Service Agency: Commodity Credit Corporation	22	47	56	60	54
Natural Resources Conservation Service: Farm Security and Rural Investment Programs	14	13	13	13	13
Rural Business Cooperative Service: Energy Assistance Payments (formerly titled Bioenergy Program for Advanced Biofuels (Sec. 9005))	0	27	14	15	15

Rural Business Cooperative Service: Biorefinery Assistance Program (Section 9003 Biorefinery Assistance Program)	0	100	30	27	0
Subtotal USDA mandatory funding	*36*	*220*	*180*	*184*	*209*
Subtotal USDA discretionary funding	*128*	*180*	*139*	*121*	*110*
Subtotal – USDA	**164**	**400**	**319**	**306**	**319**
Department of Commerce					
National Institute of Standards and Technology (NIST): Scientific and Technological Research and Services	48	54	54	54	54
National Oceanic and Atmospheric Administration Operations, Research and Facilities	1	1	1	0	1
Subtotal – Commerce	**48**	**55**	**55**	**54**	**55**
Department of Defense					
Research, Development, Test and Evaluation, Army	34	37	36	32	38
Research, Development, Test and Evaluation, Navy	176	210	194	124	152
Research, Development, Test and Evaluation, Air Force	205	181	216	427	418
Research, Development, Test and Evaluation, Defense-Wide	43	41	40	35	36
Subtotal – DOD	**458**	**469**	**486**	**618**	**643**
Department of Energy					
Energy Efficiency and Renewable Energy	1,772	1,913	1,937	2,073	2,898
Electricity Delivery and Energy Reliability	123	140	140	196	226
Nuclear Energy	738	873	884	936	912
Fossil Energy R&D: Carbon Capture and Storage (CCS) and Power Systems	436	490	503	532	564
Science: Fusion, Sequestration, and Hydrogen	859	1,007	1,441	1,578	1,853
Energy Transformation Acceleration Fund: Advance Research Projects Agency-Energy (ARPA-E)	251	280	281	291	350
Bonneville Power Administration Fund	17	10	10	0	13
Race to the Top for Energy Efficiency and Grid Modernization	0	0	0	0	0
HomeStar	0	0	0	0	0
Energy Security Trust	0	0	0	0	0
Subtotal – DOE	**4,195**	**4,714**	**5,196**	**5,606**	**6,816**
Department of Housing and Urban Development					
Management and Administration: Transformation Initiative	--	--	0	3	3
Policy Development and Research: Research and Technology	--	--	<0.5	4	4
Subtotal – HUD	**--**	**--**	**<0.5**	**7**	**7**
Department of Transportation					
National Highway Traffic Safety Administration: Operations and Research	8	10	0	11	12
Research and Innovative Technology Administration: Research and Development	1	1	1	0	1
Federal Aviation Administration: Research, Engineering and Development	20	21	22	25	25
Federal Aviation Administration: Facilities and Equipment	4	6	4	0	0
Federal Transit Administration: Research and University Research Centers and Formula and Bus Grants	33	0	0	0	0

Federal Railroad Administration: Railroad Research and Development	1	2	0	3	15
Pipeline and Hazardous Materials Safety Administration: Hazardous Materials Safety	--	--	1	1	1
Subtotal – DOT	**67**	**39**	**27**	**40**	**54**
Environmental Protection Agency					
Environmental Programs and Management	95	100	95	95	108
Science and Technology	16	8	9	8	11
Subtotal – EPA	**111**	**108**	**105**	**103**	**119**
National Aeronautics and Space Administration					
Aeronautics	255	282	323	305	321
Exploration	6	5	5	3	4
Space Technology	25	26	36	29	23
Subtotal – NASA	**287**	**313**	**363**	**338**	**348**
National Science Foundation					
Research and Related Activities	**346**	**370**	**370**	**372**	**512**
Nuclear Regulatory Commission					
Salaries and Expenses	**68**	**91**	**69**	**86**	**90**
Tennessee Valley Authority					
Tennessee Valley Authority Fund	**11**	**10**	**10**	**10**	**16**
Total [2]	**5,755**	**6,567**	**6,999**	**7,539**	**8,978**

[1] Office of the Chief Economist includes USDA's Climate Change Program Office and The Office of Energy Policy and New Uses (OEPNU) Research and Development
[2] Agency subtotals may not add to table total due to rounding.

LINKAGES TO STRATEGIC PLANS

Department of Agriculture — USDA Strategic Plan 2014-2018; **Goal 2, Objective 2.2:** *Lead efforts to mitigate and adapt to climate change, drought and extreme weather in agriculture and forestry.*

Department of Commerce — Commerce Strategic Plan 2014-2018; **Strategic Goal 3:** *Help communities and businesses prepare for and prosper in a changing environment.*

Department of Defense — DOD Operational Energy Strategy 2016; **Objective 1:** *Increase future warfighting capability by including energy throughout future force development;* **Objective 2:** *Identify and reduce logistics and operational risks from operational energy vulnerabilities;* **Objective 3:** *Enhance mission effectiveness of the current force through updated equipment and improvements in training, exercises, and operations.*

Department of Energy — DOE Strategic Plan 2014-2018; **Goal 1:** *Advance foundational science, innovate energy technologies, and inform data driven policies that enhance U.S. economic growth and job creation, energy security, and environmental quality, with emphasis on implementation of the President's Climate Action Plan to mitigate the*

	risks of and enhance resilience against climate change.
Department of Transportation	DOT Strategic Plan 2014-2018; **Strategic Goal:** *Advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources.*
Environmental Protection Agency	EPA Strategic Plan 2014-2018; **Goal 1:** *Addressing climate change and improving air quality.*
National Aeronautics and Space Administration	**NASA FY 2014 Strategic Plan; Strategic Objective 1.7:** *Transform NASA missions and advance the Nation's capabilities by maturing crosscutting and innovative space technologies;* **Strategic Objective 2.1:** *Enable a revolutionary transformation for safe and sustainable U.S. and global aviation by advancing aeronautics research.*
National Science Foundation	NSF Strategic Plan 2014-2018; **Strategic Goal 1:** *Transform the frontiers of science and engineering;* **Strategic Goal 2:** *Stimulate innovation and address societal needs through research and education.*
Nuclear Regulatory Commission	NRC Strategic Plan 2014-2018; **Strategic Goal:** *Ensure the safe use of radioactive materials.*
Tennessee Valley Authority	TVA Strategic Plan 2014-2018: *Provide affordable electric power throughout the Tennessee Valley Region; Act as a steward of the Tennessee Valley's natural resources; Serve as a catalyst for sustainable economic development.*

4. INTERNATIONAL ASSISTANCE

Table 4

International Assistance

Details by Agency/Account

(Budget authority in millions of dollars)

International Assistance [1]	FY 2013 Final Operating Levels	FY 2014 Enacted Budget Authority	FY 2015 Enacted Budget Authority	FY 2016 Enacted Budget Authority	FY 2017 President's Budget Request
Core Agencies [2]					
Department of State					
Economic Support Fund	91	92	112	559	586
International Organizations and Programs	35	36	36	36	46
Subtotal -- State	**126**	**127**	**147**	**595**	**632**
Department of Treasury [3]					
Clean Technology Fund	196	210	201	171	0
Strategic Climate Fund	110	75	63	60	0
Green Climate Fund	0	0	0	0	250
Global Environment Facility [4]	62	72	82	101	88
Central America and Caribbean Catastrophe Risk Insurance Program	0	0	0	0	13
Debt Restructuring - Tropical Forest Conservation	11	0	0	0	0
Subtotal - Treasury	**380**	**356**	**346**	**331**	**350**
U.S. Agency for International Development (USAID)					
Development Assistance	308	296	272	268	310
Economic Support Fund	27	55	59	21	42
Assistance for Europe, Eurasia, and Central Asia [5]	0	0	0	16	0
Subtotal - USAID	**334**	**351**	**331**	**304**	**352**
Subtotal Core Agencies	**840**	**834**	**824**	**1,230**	**1,334**
Complementary Agencies [6]					
Department of Agriculture					
U.S. Forest Service - State and Private Forestry	3	3	3	1	3
Department of Energy					
Energy Programs	13	13	9	9	9
Environmental Protection Agency					
Environmental Programs & Management	16	17	17	17	19
Millennium Challenge Corporation [6]					
Millennium Challenge Corporation	0	103	352	219	0
National Aeronautics and Space Administration					

Science	6	6	6	6	7
National Science Foundation					
Research and Related Activities	6	4	2	1	1
Peace Corps [7]					
Peace Corps	13	12	12	12	12
U.S. Trade and Development Agency					
U.S. Trade and Development Agency	19	22	27	32	42
Total	**916**	**1,013**	**1,252**	**1,527**	**1,426**

[1] Data are current as of November 2016 and reflect estimated budget authority in millions of dollars. Estimates are subject to change. Agency subtotals and table total may not add due to rounding.
[2] The Core Agencies category reflects programs at the Department of State, Department of the Treasury, and USAID for which climate change is a direct, primary objective. Indirect climate assistance is also provided through USAID programs in other development sectors such as agriculture, water, and health that do not necessarily have a primary climate objective but nevertheless may provide climate benefits.
[3] The FY 2013, FY 2014, FY 2015, and FY 2016 totals for Treasury climate change programs include statutory transfers of funds from the Department of State. These transfers were, respectively, $84 million, $50 million, $30 million, and $10 million.
[4] For FY 2013 and FY 2014, the table reflects an allocation of 50% of GEF funds to programs related to climate change. For FY 2015, FY 2016, and FY 2017, the table reflects an allocation of 60% of GEF funds to programs related to climate change—and updated estimate based on programming breakdowns for the Sixth Replenishment of the GEF.
[5] The Assistance for Europe, Eurasia, and Central Asia account was included in FY 2016 Enacted appropriations and supports programming in countries that, in other years shown in the table, were or would be supported by the Economic Support Fund account.
[6] The Complementary Agencies category was first included in the version of this report that followed the FY 2011 President's Budget, as a means to account for technical and in some cases direct support for international efforts to address climate change. Not reflected here are funding estimates related to development finance and export credit agencies' international climate investments.
[7] While MCC does not have dedicated climate change funding or objectives, some investments prioritized by partner governments to reduce poverty also generate climate change co-benefits, reducing greenhouse gas emissions or increasing resilience to changing weather patterns. MCC commits funding for its multi-year projects in full in the year a compact is signed with partner governments using previous years' enacted funds.
[8] Peace Corps' environment and agricultural programs assist host countries worldwide with projects related to environmental education, environmental awareness, protected areas and wildlife, agroforestry and reforestation. This is the first year that Peace Corps has been included in this report.

LINKAGES TO STRATEGIC PLANS

Department of State & U.S. Agency for International Development

Department of State and USAID Strategic Plan 2014-2017;
Strategic Goal 3: *Promote the transition to a low-emission, climate-resilient world while expanding global access to sustainable energy.*

Quadrennial Diplomacy and Development Review 2015;
Strategic Priority: *Mitigating and adapting to climate change.*

USAID Climate Change & Development Strategy 2012-2016;
Accelerate the transition to low-emission development through investments in clean energy and sustainable landscapes; Increase resilience of people, places, and livelihoods through investments in adaptation; Strengthen development outcomes by integrating climate change in Agency programming.

5. ENERGY-RELATED TAX PROVISIONS THAT MAY REDUCE GREENHOUSE GASES

The table below includes existing energy tax provisions and energy payments in lieu of tax provisions that may reduce greenhouse gases. A tax expenditure is an exception to baseline provisions of the tax structure that usually results in a reduction in the amount of tax owed. The table below also includes estimated payments from the Department of the Treasury authorized by Section 1603 of the American Recovery and Reinvestment Act.

All tax expenditure estimates are based upon current tax law enacted as of July 1, 2015.[2] Expired or repealed provisions are not listed if their revenue effects result only from taxpayer activity occurring before FY 2017. Summary descriptions of the provisions included here can be found in *Analytical Perspectives, Budget of the United States Government*, Fiscal Year 2017, Chapter 14.

Table 5
Energy Tax Provisions That May Reduce Greenhouse Gases
(Revenue effect in millions of dollars)

	2015	2016	2017	2018	2019	2020	2021	2017-2021
Energy Production Credit (without coal)[1]	1,540	1,940	2,240	2,300	2,220	2,210	2,040	11,010
Energy Investment Credit	1,010	1,470	970	250	40	130	320	1,710
Tax credit for alternative motor vehicles and refueling property	540	550	670	820	810	700	500	3,500
Exclusion of utility conservation subsidies	430	450	470	490	520	540	570	2,590
Credit for holding clean renewable energy bonds	70	70	70	70	70	70	70	350
Allowance of deduction for certain energy efficient commercial building property	30	-10	-30	-30	-30	-30	-30	-150
Credit for construction of new energy efficient homes	760	20	0	0	0	0	0	0
Credit for energy efficiency improvements to existing homes	270	0	0	0	0	0	0	0
Credit for residential energy efficient property	850	770	460	180	40	0	0	680
Qualified energy conservation bonds	30	30	30	30	30	30	30	150
Advanced nuclear power production credit	0	140	140	140	340	620	690	1,930
Industrial CO2 capture and sequestration tax credit	80	110	150	190	80	0	0	420

[2] The estimates and their descriptions do not include the effects of the Protecting Americans from Tax Hikes Act of 2015 (PATH) which was enacted on December 17, 2015 or the Consolidated Appropriations Act of 2015.

Tax Provisions Subtotal	**5,610**	**5,540**	**5,170**	**4,440**	**4,120**	**4,270**	**4,190**	**22,190**
Energy Payments in Lieu of Energy Investment Credit [1]	2,300	1,200	650	0	0	0	0	4,150
Tax Provisions plus Energy Payments	**7,910**	**6,740**	**5,820**	**4,440**	**4,120**	**4,270**	**4,190**	**26,340**

[1] The payments are considered outlays and are direct substitutes for energy tax provisions.

APPENDIX

Expenditures by Agency

Details by Agency/Account

(Budget authority in millions of dollars)

Expenditures by Agency	FY 2013 Final Operating Level	FY 2014 Enacted Budget Authority	FY 2015 Enacted Budget Authority	FY 2016 Enacted Budget Authority	FY 2017 President's Budget Request
Department of Agriculture					
Global Change Research Program					
Agricultural Research Program	38	38	45	45	65
National Institute of Food and Agriculture	40	43	20	15	19
Economic Research Service	2	2	1	2	3
Forest Service - Forest and Rangeland Research	26	27	25	28	28
National Agricultural Statistics Service	1	1	1	1	1
National Resources Conservation Services	1	1	2	3	3
Animal and Plant Health Inspection Service	--	--	0	<0.5	<0.5
Farm Service Agency	--	--	0	1	1
Office of the Chief Economist	--	--	3	3	3
USDA - GCRP Subtotal	**108**	**115**	**97**	**98**	**124**
Clean Energy Technology					
Natural Resources Conservation Service - Conservation Operations[1]	<0.5	<0.5	<0.5	<0.5	<0.5
Agricultural Research Service -Salaries and Expenses	32	32	33	30	31
National Institute of Food and Agriculture - Research and Education Activities	56	49	53	48	67
Forest Service - Commercialization/Renewable Energy	22	21	20	26	26
Forest Service - Forest and Rangeland Research	0	6	6	6	6
Rural Business Service - Value Added Producer Grants (Cooperative Development Grants)	1	6	1	1	1
Rural Business Service - Rural Energy for America Program	3	53	48	47	69
Rural Business Cooperative Service -- Guaranteed Business and Industry Loans	5	7	8	4	4
Rural Business Service - Rural Economic Development Loans	<0.5	0	<0.5	<0.5	1
Economic Research Service	2	2	2	2	2

Office of the Chief Economist - Salaries and Expenses	3	5	2	2	2
Rural Utilities Service - High Cost Energy Grants	4	4	8	10	0
Rural Utilities Service – Rural Energy Savings Program Account (Rural Energy for America Sec. 9007)	--	--	0	8	0
2008 Farm Bill, Mandatory Funding					
Rural Business Cooperative Service - Rural Energy for America Program	0	0	0	0	0
National Institute of Food and Agriculture - Biomass Research and Development	0	3	3	3	3
Farm Service Agency - Biomass Crop Assistance Program	0	25	23	3	25
Farm Service Agency - Commodity Credit Corporation	22	47	56	60	54
Natural Resources Conservation Service - Farm Security and Rural Investment Programs	14	13	13	13	13
Rural Business Service - Energy Assistance Payments (formerly titled Bioenergy Program for Advanced Biofuels)	0	27	14	15	15
Rural Business Cooperative Service - Biorefinery Assistance Program	0	100	30	27	0
Subtotal - mandatory funding	*36*	*215*	*139*	*121*	*110*
Subtotal - discretionary funding	*128*	*185*	*180*	*184*	*209*
USDA - Clean Energy Subtotal	**164**	**400**	**319**	**306**	**319**
International Assistance					
Forest Service - State and Private Forestry	3	3	3	1	3
Total - U.S. Department of Agriculture	**274**	**517**	**418**	**405**	**446**
Department of Commerce					
Global Change Research Program					
National Oceanic and Atmospheric Administration - Operations, Research and Facilities	233	285	264	252	307
National Oceanic and Atmospheric Administration - Procurement Acquisition and Construction	64	40	44	28	31
National Institute of Standards and Technology (NIST)	4	4	4	4	4
DOC - GCRP Subtotal	**301**	**329**	**312**	**283**	**342**
Clean Energy Technology					
National institute of Standards and Technology (NIST) - Scientific and Technological Research and Services	48	54	54	54	54
National Oceanic and Atmospheric Administration - Operations, Research and Facilities	1	1	1	0	1

DOC - Clean Energy Subtotal	**48**	**55**	**55**	**54**	**55**
Total - Department of Commerce	**349**	**384**	**367**	**337**	**397**
Department of Defense					
Clean Energy Technology					
Research, Development, Test and Evaluation, Army	34	37	36	32	38
Research, Development, Test and Evaluation, Navy	176	210	194	124	152
Research, Development, Test and Evaluation, Air Force	205	181	216	427	418
Research, Development, Test and Evaluation, Defense Wide	43	41	40	35	36
Total - Department of Defense	**458**	**469**	**486**	**618**	**643**
Department of Energy					
Global Change Research Program					
Science - Biological & Environmental Research	209	217	214	238	242
Clean Energy Technology					
Energy Efficiency and Renewable Energy	1,772	1,913	1,937	2,073	2,898
Electricity Delivery and Energy Reliability	123	140	140	196	226
Nuclear Energy	738	873	884	936	912
Fossil Energy R&D - Carbon Capture and Storage (CCS) and Power Systems	436	490	503	533	564
Science--Fusion, Sequestration, and Hydrogen	859	1,007	1,441	1,578	1,853
Energy Transformation Acceleration Fund - Advance Research Projects Agency - Energy (ARPA-E)	251	280	281	291	350
Bonneville Power Administration Fund	17	10	10	0	13
Race to the Top for Energy Efficiency and Grid Modernization	0	0	0	0	0
HomeStar	0	0	0	0	0
Energy Security Trust	0	0	0	0	0
DOE - Clean Energy Subtotal	**4,195**	**4,714**	**5,196**	**5,606**	**6,816**
International Assistance					
Energy Programs	13	13	9	9	9
Adjustments for programs included in multiple categories -- DOE	*-13*	*-13*	*-9*	*-9*	*-9*
Total - Department of Energy	**4,404**	**4,931**	**5,410**	**5,844**	**7,058**
Department of Health and Human Services					
Global Change Research Program					
National Institutes of Health	10	8	8	8	8

Total - Department of Health and Human Services	**10**	**8**	**8**	**8**	**8**
Department of Housing and Urban Development					
Clean Energy					
Management and Administration - Transformation Initiative	--	--	0	3	3
Policy Development and Research - Research and Technology	--	--	<0.5	4	4
Total - Department of Housing and Urban Development	--	--	**<0.5**	7	7
Department of the Interior					
Global Change Research Program					
U.S. Geological Survey - Surveys, Investigations, and Research	55	54	58	57	63
Total - Department of the Interior	**55**	**54**	**58**	**57**	**63**
Department of State					
Global Change Research Program					
Other-non-add	*3*	*3*	--	--	--
International Assistance					
Economic Support Fund	91	92	112	559	586
International Organizations and Programs	35	36	36	36	46
State - International Assistance Subtotal	**126**	**127**	**147**	**595**	**632**
Total - Department of State	**126**	**127**	**147**	**595**	**632**
Department of Transportation					
Global Change Research Program					
Federal Highway Administration - Federal-Aid Highways	0	0	0	0	0
Federal Aviation Administration - Research, Engineering, and Development	1	1	1	1	1
Federal Transit Administration - Research and University Research Centers	0	0	0	0	0
DOT - GCRP Subtotal	**1**	**1**	**1**	**1**	**1**
Clean Energy Technology					
National Highway Traffic Safety Administration	8	10	0	11	12
Research and Innovative Technology Administration - Research and Development	1	1	1	0	1
Federal Aviation Administration - Research, Engineering, and Development	20	21	22	25	25

Federal Aviation Administration - Facilities and Equipment	4	6	4	0	0
Federal Transit Administration - Research and University Research Centers and Formula and Bus Grants	33	0	0	0	0
Federal Railroad Administration - Railroad Research and Development	1	2	0	3	15
Pipelines and Hazardous Materials Safety Administration - Hazardous Materials Safety	--	--	1	1	1
DOT - Clean Energy Subtotal	**67**	**39**	**27**	**40**	**54**
Total - Department of Transportation	**67**	**39**	**28**	**41**	**55**
Department of the Treasury					
International Assistance					
Clean Technology Fund	196	210	201	171	0
Strategic Climate Fund	110	75	63	60	0
Green Climate Fund	0	0	0	0	250
Global Environmental Facility	62	72	82	101	88
Central America and Caribbean Catastrophe Risk Insurance Program	0	0	0	0	13
Debt Restructuring - Tropical Forestry Conservation	11	0	0	0	0
Total - Department of the Treasury	**380**	**356**	**346**	**331**	**350**
U.S. Agency for International Development					
Global Change Research Program					
Development Assistance - non- add	*11*	*11*	*6*	*9*	*10*
International Assistance					
Development Assistance	308	296	272	268	310
Economic Support Fund	27	55	59	21	42
Assistance for Europe, Eurasia, and Central Asia	0	0	0	16	0
Total - U.S. Agency for International Development	**334**	**351**	**331**	**304**	**352**
Environmental Protection Agency					
Global Change Research Program					
Science and Technology	17	18	16	19	22
Clean Energy Technology					
Environmental Programs and Management	95	100	95	95	108
Science and Technology	16	8	9	8	11
EPA - Clean Energy Subtotal	**111**	**108**	**120**	**122**	**139**

International Assistance					
Environmental Programs and Management	16	17	17	17	19
Adjustments for programs included in multiple categories -- EPA	*-7*	*-8*	*-8*	*-8*	*-10*
Total - Environmental Protection Agency	**137**	**135**	**145**	**150**	**170**
Millennium Challenge Corporation					
International Assistance					
Millennium Challenge Corporation	0	103	352	219	0
Total - Millennium Challenge Corporation	**0**	**103**	**352**	**219**	**0**
National Aeronautics and Space Administration					
Global Change Research Program					
Science	1,395	1,431	1,417	1,534	1,617
Clean Energy Technology					
Aeronautics	255	282	323	305	321
Exploration	6	5	5	3	4
Space Technology	25	26	36	29	23
NASA - Clean Energy Subtotal	**287**	**313**	**363**	**338**	**348**
International Assistance					
Science	6	6	6	6	7
Adjustments for programs included in multiple categories -- NASA	*-6*	*-6*	*-6*	*-6*	*-7*
Total - National Aeronautics and Space Administration	**1,682**	**1,744**	**1,780**	**1,872**	**1,965**
National Science Foundation					
Global Change Research Program					
Research and Related Activities	316	313	331	339	348
Clean Energy Technology					
Research and Related Activities	346	370	370	372	512
International Assistance					
Research and Related Activities	6	4	2	1	1
Total - National Science Foundation	**668**	**686**	**703**	**712**	**861**
Nuclear Regulatory Commission					
Clean Energy Technology					
Salaries and Expenses	68	91	69	86	90

Total - Nuclear Regulatory Commission	**68**	**91**	**69**	**86**	**90**
Peace Corps					
International Assistance					
Peace Corps	13	12	12	12	12
Total - Peace Corps	**12**	**12**	**12**	**12**	**12**
Smithsonian Institution					
Global Change Research Program					
Salaries and Expenses	8	8	8	8	9
Total - Smithsonian Institution	**8**	**8**	**8**	**8**	**9**
Tennessee Valley Authority					
Clean Energy Technology					
Tennessee Valley Authority Fund	11	10	10	10	16
Total - Tennessee Valley Authority	**11**	**10**	**10**	**10**	**16**
U.S. Trade and Development Agency					
International Assistance					
U.S. Trade and Development Agency	19	22	27	32	42
Total - U.S. Trade and Development Agency	**19**	**22**	**27**	**32**	**42**
Total All Agencies[1]	**9,062**	**10,045**	**10,689**	**11,627**	**13,156**
Energy-Related Tax Provisions That May Reduce Greenhouse Gases	6,329	6,509	5,610	5,540	5,170
Energy Payments in Lieu of Energy Investment Credit	8,080	4,710	2,300	1,200	650
Total All Agencies + Tax Provisions	**23,471**	**21,264**	**18,599**	**18,367**	**18,976**

Footnotes:
[1] Totals may not sum due to rounding.